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SPECIFICATION

Title of the Invention :

VIDEO STORAGE AND RETRIEVAL APPARATUS

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VIDEO STORAGE AND RETRIEVAL APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an apparatus and
5 method for retrieving a scene that a user desires, based
on identification information inserted in digital video
signals, from a recording media with the digital video
signals recorded therein, to reproduce.

Description of the Related Art

10 Japanese Unexamined Patent Publication 8-130701
discloses a video retrieving apparatus that searches a
desired scene based on the contents of the moving video
to reproduce. FIG.1 is a schematic configuration
diagram of a video retrieving apparatus described in
15 Japanese Unexamined Patent Publication 8-130701.

In FIG.1, recorded in storage section 10 is video
data comprised of bitstreams conforming to MPEG
(International Standard for Moving Picture Coding).
Identification information indicative of the contents
20 of the scene corresponding to the user area is inserted
in the user data area in the bitstreams. MPEG decoder
20 has a user area code extraction section 28 that
extracts the identification information inserted in the
user data area. Retrieval section 30 is comprised of
25 retrieval information input section 32 to which the
contents of the scene a user desires are input, comparison
section 31 which compares the contents input from

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retrieval information input section 32 to the extracted contents by the user area code extraction section 28.

When the contents of the desired scene is input from retrieval information input section 32, control section 5 12 is provided with an instruction to retrieve the video signal having the identification information matching the retrieval scene from video signals in storage section 11. Then, when the retrieval scene and identification information match, retrieval section 30 provides an 10 instruction indicative of ON to MPEG decoder 20, and then the decoding and indication of the corresponding video signals (scene) are initiated.

The case expected as an example of using the video retrieving apparatus is that a desired scene is retrieved 15 from a program while another program is reproduced. For example, there is the case that a user searches the tomorrow weather forecast from a recorded news program to reproduce while reproducing, for example, a recorded drama program. Such a case demands a user interface 20 which executes the retrieval without discontinuing the reproduced drama program, and starts reproducing the video of the retrieved weather forecast immediately after the retrieval is finished or after the reproduced program is finished. To achieve such a user interface, 25 it is necessary to execute processing for the video reproduction and retrieval in parallel.

To execute the retrieval of the video from the

identification information inserted in the bitstreams conforming to MPEG, it is necessary to extract the data from the user data area in the bitstreams. However, it is not possible for one MPEG decoder as in the video 5 retrieving apparatus illustrated in FIG.1 to execute the processing for the video reproduction and retrieval in parallel.

SUMMARY OF THE INVENTION

10 The present invention is carried out in view of the foregoing, and an object of the present invention is to provide a video storage and retrieval apparatus capable of executing the reproduction of a video and the retrieval of a desired scene in parallel, and providing excellence 15 as a user interface with good operability provided.

In various data streams including an MPEG stream, compressed coded video streams, audio streams, and private streams to store user data are multiplexed (hereinafter, the private stream is called retrieval 20 data stream since identification information for retrieval is used as the user data in the present invention).

Execution of the reproduction and retrieval from the above-mentioned data streams requires a 25 demultiplexing function for demultiplexing the multiplexed data streams to the private streams, video streams and audio streams, a video decoding and audio

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decoding function for extending the compressed coded video and audio data to decode, and a retrieval function for executing the retrieval. Accordingly, to execute the reproduction and retrieval in parallel, it is
5 necessary to concurrently process streams being reproduced and streams for retrieval, however the function requiring concurrent processing is only the demultiplexing function.

The present invention enables the concurrent
10 execution of the reproduction of video and retrieval by providing a plurality of demultiplexing sections.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and features of the
15 invention will appear more fully hereinafter from a consideration of the following description taken in connection with the accompanying drawing wherein one example is illustrated by way of example, in which;

FIG.1 is a schematic configuration diagram to
20 explain a conventional video storage and retrieval apparatus;

FIG.2 is a schematic configuration diagram of a video storage and retrieval apparatus according to a first embodiment;

25 FIG.3A is a diagram illustrating an exemplary structure of a MPEG stream according to the above embodiment;

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FIG.3B is a diagram illustrating an exemplary structure of video signal:

FIG.3C is a diagram illustrating an exemplary structure of GOP:

5 FIG.4 is a schematic configuration diagram of a
video storage and retrieval apparatus according to a
second embodiment:

FIG.5 is a schematic configuration diagram of a video storage and retrieval apparatus according to a

10 third embodiment;

FIG.6A is a diagram illustrating an exemplary structure of a MPEG stream according to the third embodiment:

FIG.6B is a diagram illustrating an exemplary structure of a demultiplexed data stream.

FIG. 6C is a diagram illustrating an exemplary structure of a data stream for retrieval.

FIG.7 is a schematic configuration diagram of a video storage and retrieval apparatus according to a fourth embodiment.

FIG. 8 is a schematic configuration diagram of a video storage and retrieval apparatus according to a fifth embodiment:

FIG.9 is a schematic configuration diagram of a
25 video storage and retrieval apparatus according to a
sixth embodiment:

FIG. 10 is a schematic configuration diagram of a

video storage and retrieval apparatus according to a seventh embodiment;

FIG.11 is a schematic configuration diagram of a video storage and retrieval apparatus according to an
5 eighth embodiment; and

FIG.12 is a schematic configuration diagram of a video storage and retrieval system according to a ninth embodiment.

10 DETAILED DESCRIPTION OF THE
 PREFERRED EMBODIMENTS

Embodiments of the present invention will be described below with reference to accompanying drawings. The following description explains as an example of data stream the MPEG bitstream conforming to the MPEG that is the moving picture coding standard. However, it is obvious that the present invention is applicable to the data stream other than the MPEG stream conforming to the
15 MPEG that is the moving picture coding standard.

20 (First embodiment)

FIG.2 is a block diagram of a video storage and retrieval apparatus according to the first embodiment of the present invention. The video storage and retrieval apparatus is comprised of MPEG stream input
25 section 1 to which the MPEG stream is input, video output section 2 which outputs a decoded video signal, and audio output section 3 which outputs a decoded audio signal.

The MPEG stream received in MPEG stream input section 1 is stored in storage section 11. Storage section 11 has a plurality of output ports, and the recorded plurality of MPEG streams can be accessed concurrently.

5 Storage section 11 is controlled by control section 12. Control section 12 controls the read of the MPEG stream stored in storage section 11 according to the instruction from retrieval section 30.

Two output ports of storage section 11 are coupled

10 to respective first demultiplexing section 21 and second demultiplexing section 22 which can be accessed concurrently. First demultiplexing section 21 demultiplexes video streams and audio streams from the MPEG stream read from storage section 11 to reproduce.

15 Second demultiplexing section 22 demultiplexes retrieval streams from the MPEG stream read from storage section 11 to retrieve. The video streams, audio streams and retrieval streams are multiplexed in the MPEG stream.

First demultiplexing section 21 is connected to

20 video decoding section 23 and audio decoding section 24 in parallel. Video decoding section 23 extends the compressed video streams to decode, and outputs the decoded signal to video output section 2. Audio decoding section 24 extends the compressed audio streams to decode,

25 and outputs the decoded signal to audio output section 3. Video decoding section 23 and audio decoding section 24 operate synchronously.

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Retrieval section 30 is comprised of comparison section 31 and retrieval information input section 32. Retrieval information input section 32 receives the inputted retrieval information(contents of the scene).
5 Comparison section 31 compares the identification information in the retrieval data stream, which is read from storage section 11 and then demultiplexed in second demultiplexing section 22, to the retrieval scene from retrieval information input section 32, while
10 instructing control section 12 on the read of the MPEG stream to retrieve.

FIG.3A illustrates an exemplary structure of the MPEG stream in this embodiment. As illustrated in FIG.3A, the MPEG stream is comprised of stream header 101 to store stream information, a plurality of coded video streams (video stream (1) 102 to video stream (n) 105), a plurality of coded audio streams (audio stream (1) 103 to audio stream (n) 106), and a plurality of retrieval data streams (retrieval data stream (1) 104
20 to retrieval data stream (n) 106) as identification data with identification information for retrieval incorporated therein.

The identification information indicative of the contents of the corresponding scene is recorded in the
25 retrieval data stream along with PTS (Presentation Time Stamp) that is information to synchronously reproduce the corresponding video data streams and audio data

streams, or time code. And each of the video data streams, the audio data streams and the retrieval data streams is constructed in packets and multiplexed as PES (Packetized Elementary Stream). Further, it may be
5 possible to insert the retrieval data streams as a private descriptor in the PAT (Program Association Table), PMT (Program Map Table) or CAT (Conditional Access Table) to multiplex with the video data and audio data.

10 FIG.3B is an exemplary structure of the video signals comprised of a plurality of GOPs (Group of Picture) comprised of coded video data, and FIG.3C illustrates an exemplary structure of a GOP header. The picture sequence illustrated in FIG.3B is constructed
15 in packets, and stored as element data in video stream (1) 102 to video stream (n) 105 in the MPEG stream illustrated in FIG.3A.

The GOP is a group comprised of a series of I picture, P picture and B picture obtained by coding timewise
20 successive picture frames (or fields). In an apparatus for coding a video signal to record and reproduce, the GOP is comprised of the I picture obtained by coding image in a frame (or field), the P picture obtained by executing motion compensation inter-frame (or picture) coding
25 referring to the I picture, another P picture obtained by executing motion picture compensation inter-frame (or picture) referring to the P picture obtained by executing

the inter-frame (or picture) coding as described above, and the B picture obtained by executing bidirectional motion compensation inter-frame (or field) coding referring to I pictures or P pictures between which the
5 corresponding picture (or frame) exists timewise successively.

As illustrated in FIG.3B, the sequence of coded video signals is comprised of a sequence header 201 and a plurality of GOPs (first GOP="GOP1", thereafter, the
10 data number is assigned to the same type of data in the same way as described above) 202-1 to 202-n. FIG.3C illustrates a detail of the inside of GOP2 (202-2). GOP2 is comprised of header 203, one or a plurality of I pictures 206, a plurality of P pictures 209, 212 and 215,
15 and a plurality of B pictures 207, 208, 210, 211, 213, 214, 216, 217 and 218. The numbers described in respective parenthesis each indicates a head address of each data.

The processing is executed on a GOP-by-GOP basis
20 in decoding the video signal. Video decoding section 23 executes decoding of pictures input in the order of I1, B-1, B0, P4, B2, B3 The decoded video signal is output to a display device through video output section 2, and displayed in the order of frames (B-1), (B0), I1,
25 B2, B3, P4

In addition, the PTS to synchronously reproduce the video signal and audio signal is inserted to respective

header areas of video stream (1) 102 to video stream (n)
105 and audio stream (1) 103 to audio stream (n) 106.
The time stamps is inserted in a header area (203) of
GOP1 (202-1) to GOPn (202-n).

5 The operation of the apparatus of this embodiment
with the configuration as described above is next
explained. When control section 12 receives a
reproduction instruction from a user interface, not
shown in the figure, with a program address or program
10 identification number designated, control section 12
provides the reproduction instruction to storage section
11 while specifying a header address of the MPEG stream
of the instructed program. As a result of the
instruction, the MPEG stream of the program instructed
15 by control section 12 is provided from one of output ports
of storage section 11 to first demultiplexing section
21. First demultiplexing section 21 demultiplexes the
video streams and audio streams from the MPEG stream.
The demultiplexed video streams are decoded in video
20 decoding section 23, and the demultiplexed audio streams
are decoded in audio decoding section 24. Then, the
video signal and audio signal are synchronously output
from video output section and audio output section 3.

Thus, the present invention enables the retrieval
of the desired data stream from storage section 11 even
when the program is reproduced. In other words, when the
contents of a scene to be retrieved is input to retrieval

information input section 32 of retrieval section 30 from a user, comparison section 31 instructs control section 12 so that the MPEG stream for retrieval is output from storage section 11. At this time, second demultiplexing section 22 accesses another output port other than the output port outputting the MPEG stream being reproduced. Second demultiplexing section 22 demultiplexes the retrieval data stream from the MPEG stream for retrieval. Then, the identification information inserted in the 10 retrieval data stream is output from second demultiplexing section 22 to comparison section 31.

Comparison section 31 compares the retrieval scene input to retrieval information input section 32 to the identification information in the retrieval data stream, 15 and instructs control section 12 to read out the MPEG stream stored in storage section 11 until the retrieval scene and the identification information match.

Further, second demultiplexing section 22 refers to the PTS or a value of the time code stored in the 20 retrieval data stream, and calculates the GOP head address of the corresponding picture frames, and the number of the corresponding picture frames starting from the GOP head frame, to output to retrieval section 30.

When the retrieval scene and identification 25 information match in comparison section 31, retrieval section 30 holds the GOP head address of the corresponding picture frames and the number of the corresponding

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picture frames starting from GOP head frame. Then, retrieval section 30 notifies control section 12 of the GOP head address and the number of the frames from the GOP head frame when instructs control section 12 to reproduce the retrieved scene. Thereby, it is possible to access directly the desired picture frame when the reproduction of the retrieved picture starts.

As described above, according to this embodiment, since first demultiplexing section 21 and second demultiplexing section 22 are provided, it is possible to concurrently execute the reproduction and retrieval.

In addition, it may be possible to provide a plurality of second demultiplexing sections 22 that execute the demultiplexing to extract the retrieval information and a plurality of retrieval sections 30 that search specific video and audio data based on the identification data so that the plurality of second demultiplexing sections 22 and retrieval sections 30 execute the retrieval processing in parallel on a plurality of data streams stored in storage section 11. Thereby, it is possible to speed up the retrieval processing.

Further, it may be possible that the data stream is input to second demultiplexing section 22, which executes the demultiplexing to extract the retrieval information, at a rate higher than the data transfer rate at which the data stream is input to first demultiplexing

section 21 which executes the demultiplexing to reproduce the video and audio, in order to speed up the retrieval processing.

(Second embodiment)

5 FIG.4 is a block diagram of a video storage and retrieval apparatus according to the second embodiment of the present invention. In addition, the section with the same function as in FIG.2 is given the same mark as in FIG.2 to omit the specific explanation thereof in the
10 following.

In the video storage and retrieval apparatus of this embodiment, third demultiplexing section 25 is provided between MPEG stream input section 1 and storage section 11. Third demultiplexing section 25 demultiplexes an input multiplexed MPEG stream to video streams, audio streams and retrieval data streams. The demultiplexed video streams, audio streams and retrieval data streams are recorded in storage section 11. Storage section 11 has three output ports. The output ports of storage section 11 are respectively connected to video decoding section 23, audio decoding section 24 and comparison section 31 of retrieval section 30.

The operation of the video storage and retrieval apparatus according to the second embodiment is explained below. The multiplexed MPEG stream is input to MPEG stream input section 1, and demultiplexed in third demultiplexing section 25 to video streams, audio

streams and retrieval data streams, which are stored in storage section 11.

At the time the video is reproduced, the video streams are input to video decoding section 23, while 5 the audio streams are input to audio decoding section 24, both from storage section 11, and the video and audio are synchronously output from respective sections.

In addition, at the time the video is retrieved, the retrieval data streams stored in storage section 11 10 are input to retrieval section 30, and therein the same retrieval processing as in the first embodiment is executed. Comparison section 31 searches the retrieval data stream in which the identification information matches the retrieval scene, while referring to the PTS 15 or a value of the time code stored in the retrieval data stream, and calculating the GOP head address of the corresponding picture frames, and the number of the corresponding picture frames from the GOP head frame. The calculated values are used in reproducing the 20 retrieved scene.

As described above, the video streams, audio streams and retrieval data streams demultiplexed from the MPEG stream are stored in storage section 11, while the video streams, audio streams and searches data stream 25 stored in storage section 11 are made independently accessible, and therefore it is possible to execute the reproduction of the video and audio, and the retrieval

at the same time.

(Third embodiment)

FIG.5 is a block diagram of a video storage and retrieval apparatus according to the third embodiment 5 of the present invention. In addition, the section with the same function as in FIG.2 is given the same mark as in FIG.2 to omit the specific explanation thereof in the following. In the video storage and retrieval apparatus of this embodiment, fourth demultiplexing section 26 is 10 provided between MPEG stream input section 1 and storage section 11, and fifth demultiplexing section 27 is provided between storage section 11, and video decoding section 23 and audio decoding section 24. Fourth demultiplexing section 26 demultiplexes the multiplexed 15 MPEG stream to a data stream in which video streams and audio streams are multiplexed, and retrieval data streams. Fifth demultiplexing section 27 demultiplexes the multiplexed video streams and audio streams to video streams and audio streams.

20 FIG.6A illustrates a structure of the MPEG stream input to fourth multiplexing section 26, and FIG.6B illustrates structures of the MPEG streams output from fourth demultiplexing section 26.

25 The operation of the video storage and retrieval apparatus according to this embodiment is explained below. The multiplexed MPEG stream, input to MPEG stream input section 1, is demultiplexed to video streams, audio

streams and retrieval data streams in fourth demultiplexing section 26, which multiplexes again demultiplexed video streams and audio streams, while adding stream header 111 thereto, to output. The 5 retrieval data streams and multiplexed video streams and audio streams are stored in storage section 11.

At the time the video is reproduced, the multiplexed video streams and audio streams, stored in storage section 11, are demultiplexed to the video streams and 10 audio streams by fifth demultiplexing section 27. The video streams and audio streams are converted into video signals and audio signals in video decoding section 23 and audio decoding section 24, and output therefrom, respectively.

15 At the time the video is retrieved, the retrieval data streams stored in storage section 11 are input to retrieval section 30, and the retrieval processing is executed therein. At this time, the retrieval data streams, and the multiplexed video streams and audio 20 streams can be accessed independently, and accordingly, it is possible to execute the reproduction of the video and audio, and the retrieval at the same time.

(Fourth embodiment)

FIG.7 is a block diagram of a video storage and 25 retrieval apparatus according to the fourth embodiment of the present invention. In addition, the section with the same function as in FIG.2 is given the same mark as

in FIG.2 to omit the specific explanation thereof in the following.

In the video storage and retrieval apparatus of this embodiment, temporary storage section 40 is provided
5 between storage section 11, and first demultiplexing section 21 and second demultiplexing section 22. At the time the reproduction or retrieval is executed, the MPEG data stored in storage section 11 is transferred to temporary storage section 40 at a data transfer rate
10 higher than that necessary for the ordinary video reproducing processing to be temporarily stored therein, and the stored data is provided to first demultiplexing section 21 and second demultiplexing section 22 at the same data transfer rate as in the ordinary reproducing
15 processing.

The operation of the video storage and retrieval apparatus in this embodiment is explained below. At the time of video reproduction, part of or entire MPEG stream to be reproduced is transferred to temporary storage section 40 from storage section 11 at the data transfer rate higher than that necessary for the ordinary video reproducing processing. Then, the data is transferred to first demultiplexing section 21 at the same data transfer rate as in the ordinary reproducing processing
20 from temporary storage section 40. First demultiplexing section 21 demultiplexes video streams and audio streams to respectively output to video decoding section 23 and
25

audio decoding section 24. The decoded video signals and audio signals are respectively output from video output section 2 and audio output section 3.

Meanwhile, control section 12 controls storage 5 section 11 so that storage section 11 transfers again the rest of the MPEG stream to be reproduced to temporary storage section 40 before the MPEG stream to be reproduced stored in temporary storage section 40 is all transferred to first multiplexing section 21.

10 At the time of video retrieval, a user inputs the retrieval request to retrieval section 30. In this case, control section 12 judges whether the MPEG stream to be reproduced is being transferred from storage section 11 to temporary storage section 40, and when the MPEG stream 15 is not being transferred, the MPEG stream for the retrieval is transferred from storage section 11 to temporary storage section 40. Second demultiplexing section 22 fetches the retrieval data streams from the MPEG stream for the retrieval stored in temporary storage 20 section 40, and outputs the identification information in the retrieval data stream to retrieval section 30.

While the data stream for the video reproduction is being transferred to temporary storage section 40 from storage section 11, it is not possible to read out the 25 data stream for the retrieval from storage section 11. However, after all the data streams for the video reproduction are transferred to temporary section 40,

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or at periods between which the transfer of the data streams for the video reproduction is executed periodically, it is possible to read out the data stream for the retrieval from storage section 11 even while the
5 video is being reproduced.

In the case where storage section 11 is, for example, a medium that can be accessed only sequentially such as VTR, it is not possible to concurrently access a plurality of MPEG streams stored in storage section 11 even with
10 first demultiplexing section 21 and second demultiplexing section 22 provided.

Therefore, as described above, in the case where storage section 11 is the medium that can be accessed only sequentially, by providing a recording medium 40 enabling concurrent accesses to a plurality of MPEG streams next to an output of storage section 11, it is possible to access the plurality of MPEG streams at the same time, and therefore to execute the reproduction of video and audio, and the retrieval at the same time.
15

20 Further, since the MPEG stream is transferred to temporary storage section 40 from storage section 11 at the data transfer rate higher than that for the ordinary video reproducing processing, the MPEG stream temporarily stored in temporary storage section 40 is
25 not fully consumed, thus enabling the continuous reproduction.

(Fifth embodiment)

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FIG.8 is a block diagram of a video storage and retrieval apparatus according to the fifth embodiment of the present invention. In addition, the section with the same function as in FIG.2, FIG.4 or FIG.7 is given the same mark as in FIG.2, FIG.4 or FIG.7 to omit the specific explanation thereof in the following.

In the video storage and retrieval apparatus of this embodiment, the MPEG stream, in which video streams, audio streams and retrieval data streams are multiplexed, is read from storage section 11, input to third demultiplexing section 25 to be demultiplexed to the video streams, audio streams and retrieval data streams. Then, the video streams and audio streams are stored in temporary storage 40, and at the time of retrieval, the retrieval data streams are input to retrieval section 30. The temporary storage section 40 outputs the video streams and audio streams in parallel respectively to video decoding section 23 and audio decoding section 24.

The operation of the video storage and retrieval apparatus of this embodiment is explained below. At the time of video reproduction, part of or entire MPEG stream to be reproduced is transferred to third demultiplexing section 25 from storage section 11 at the data transfer rate higher than that for the ordinary video reproducing processing.

Third demultiplexing section 25 demultiplexes the multiplexed video streams, audio streams and retrieval data streams to the video streams

and audio streams, and the retrieval data streams, and transfers the video streams and audio streams to temporary storage section 40 to temporarily store therein. Then, temporary storage section 40 transfers
5 the video streams and audio streams respectively to video decoding section 23 and audio decoding section 24 at the same data transfer rate as in the ordinary reproducing processing. Video decoding section 23 and audio decoding section 24 respectively output the decoded
10 video signals and audio signals.

Meanwhile, control section 12 controls storage section 11 so that storage section 11 transfers again the rest of the MPEG stream to be reproduced to temporary storage section 40 via third demultiplexing section 25
15 before the video streams and audio streams to be reproduced stored in temporary storage section 40 are all transferred respectively to video decoding section 23 and audio decoding section 24.

When a user inputs the retrieval request to
20 retrieval section 30, control section 12 judges whether the MPEG stream to be reproduced is being transferred from storage section 11 to temporary storage section 40, and when the MPEG stream is not being transferred, the
MPEG stream for the retrieval is transferred from storage
25 section 11 to third demultiplexing section 25.

Third demultiplexing section 25 demultiplexes the retrieval data streams from the MPEG stream for the

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retrieval, and transfers the retrieval data stream to retrieval section 30 to be subjected to retrieve processing.

As described above, in this embodiment, since the
5 retrieval data streams are not stored in temporary storage section 40, it is possible to use temporary storage section 40 of which the capacity is less than that of temporary storage section 40 in the fourth embodiment.

10 In addition, in the above-mentioned embodiment, it may be possible that temporary storage section 40 is comprised of a random access memory device, the identification data demultiplexed from the MPEG stream as an object for the retrieval is also stored in temporary
15 storage section 40, and that retrieval section 30 executes the retrieval processing using the identification data read from temporary storage section 40.

Further, in the above-mentioned embodiment, it may
20 be possible that temporary storage section 40 is comprised of a random access memory device, third demultiplexing section 25 demultiplexes the MPEG stream as an object to be reproduced and/or for retrieval to the identification data, and streams of multiplexed
25 video data and audio data, temporary storage section 40 stores the streams of video data and audio data, and the decoding section comprised of video decoding section 23

DOCUMENT SECTION

and audio decoding section 24 decodes the streams of video data and audio data.

Furthermore, in the above-mentioned embodiment, it may be possible that temporary storage section 40 is comprised of a random access memory device, third demultiplexing section 25 demultiplexes the MPEG stream as an object to be reproduced and/or for retrieval to the identification data, and streams of multiplexed video data and audio data to respectively store in temporary storage section 40. Then, the decoding section comprised of video decoding section 23 and audio decoding section 24 decodes the streams of video data and audio data, while retrieval section 30 executes the retrieval processing using the identification data read from temporary storage section 40.

(Sixth embodiment)

FIG.9 is a block diagram of a video storage and retrieval apparatus according to the sixth embodiment of the present invention. In addition, the section with the same function as in FIG.2 or FIG.7 is given the same mark as in FIG.2 or FIG.7 to omit the specific explanation thereof in the following.

The video storage and retrieval apparatus of this embodiment has temporary storage section 40 provided between storage section 11 and first demultiplexing section 21 in the configuration of the first embodiment.

The operation of the video storage and retrieval

apparatus in this embodiment is explained below. At the time of video reproduction, the MPEG stream stored in storage section 11 is transferred to temporary storage section 40 from storage section 11 at the data transfer rate higher than that for the ordinary video reproducing processing. Then, the MPEG stream is transferred to first demultiplexing section 21 from temporary storage section 40 at the same data transfer rate as in the ordinary reproducing processing. First demultiplexing section 21 demultiplexes video streams and audio streams from the MPEG stream, and outputs video streams and audio streams respectively to video decoding section 23 and audio decoding section 24. Thereby, the decoded video signals and audio signals are output.

Meanwhile, control section 12 controls storage section 11 so that storage section 11 transfers again the rest of the MPEG stream to be reproduced to temporary storage section 40 before the MPEG stream to be reproduced stored in temporary storage section 40 is all transferred to first multiplexing section 21.

When a user inputs the retrieval request to retrieval section 30, control section 12 judges whether the MPEG stream to be reproduced is being transferred from storage section 11 to temporary storage section 40, and when the MPEG stream is not being transferred, the MPEG stream for the retrieval is transferred from storage section 11 to second multiplexing section 22. Second

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demultiplexing section 22 demultiplexes the retrieval data streams (or identification information) from the MPEG stream to output to retrieval section 30. Retrieval section 30 executes the retrieval processing using the 5 identification information and retrieval scene.

With respect to the data stream comprised of multiplexed video streams, audio streams and retrieval data streams, when the data amount of the retrieval data streams is smaller than that of the video streams and 10 audio streams, second demultiplexing section 22 can execute the demultiplexing processing for demultiplexing the retrieval data streams sufficiently faster than the processing time required for the video reproduction.

15 Accordingly, even if storage section 11 is a medium that can be accessed only sequentially such as a VTR, it is possible to access a plurality of MPEG streams at the same time.

(Seventh embodiment)

20 FIG.10 is a block diagram of a video storage and retrieval apparatus according to the seventh embodiment of the present invention. In addition, the section with the same function as in FIG.2 or FIG.4 is given the same mark as in FIG.2 or FIG.4 to omit the specific explanation 25 thereof in the following.

The video storage and retrieval apparatus of this embodiment has second storage section 13 provided

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between third demultiplexing section 25 and retrieval section 30 in the configuration of the second embodiment. Second storage section 13 is comprised of a recording device that can be accessed randomly such as a 5 semiconductor memory, HDD, DVD-RAM, PD and optical-magnetic disk alone or in thereof.

The operation of the video storage and retrieval apparatus according to the above embodiment is explained below. The multiplexed MPEG stream input to MPEG stream input section 1 is demultiplexed in third demultiplexing section 25 to video streams, audio streams and retrieval data streams. The demultiplexed video streams and audio streams are stored in storage section 11, and the demultiplexed retrieval data streams are stored in second storage section 13.

At the time of video reproduction, the video streams and audio streams, stored in storage section 11, are respectively input to video decoding section 23 and audio decoding section 24, which respectively output the video and audio. On the other hand, at the time of retrieval, the retrieval data streams, stored in second storage section 13, are input to retrieval section 30, which executes the retrieval processing.

As described above, the multiplexed MPEG stream is demultiplexed to the video streams, audio streams and retrieval data streams before being stored in storage sections, and the video streams and audio streams used

for the video reproduction are stored in storage section 11, and the retrieval data streams used for the retrieval are stored in another storage section, i.e., second storage section 13, thereby it is possible to 5 concurrently execute the video reproduction and retrieval in parallel even if storage section 11 is the medium that can be accessed only sequentially such as a VTR. Further, since only the retrieval data streams are stored in second storage section 13 comprised of the 10 recording device that can be accessed randomly, it is possible to execute fast video retrieval.

In addition, in the above-mentioned embodiment, it may be possible to provide fourth demultiplexing section 26 illustrated in FIG.5 before storage section 11 and 15 second storage section 13 instead of third demultiplexing section 25, and further provide fifth demultiplexing section 27 illustrated in FIG.5 between storage section 11, and video decoding section 23 and audio decoding section 24. Then, retrieval section 30 20 may execute the retrieval processing while fetching the identification data from second storage section 13. According to this configuration, it is also possible to execute the fast retrieval, and to concurrently execute the video reproduction and retrieval in parallel, even 25 if storage section 11 is comprised of the medium that can be accessed only sequentially such as the VTR.

Further, in the above-mentioned embodiment, it may

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be possible that retrieval section 30 executes the retrieval processing while fetching the identification data from second storage section 13, selects a period matching the pre-registered retrieval condition, and stores the streams of video data and audio data demultiplexed from the MPEG stream corresponding to the selected period in storage section 11.

Furthermore, in the above-mentioned embodiment, it may be possible to provide fourth demultiplexing section 26 illustrated in FIG.5 before storage section 11 and second storage section 13 instead of third demultiplexing section 25, and further provide fifth demultiplexing section 27 illustrated in FIG.5 between storage section 11, and video decoding section 23 and audio decoding section 24. Then, retrieval section 30 may execute the retrieval processing while fetching the identification data from second storage section 13, select a period matching the pre-registered retrieval condition registered, and store the streams of video data and audio data demultiplexed from the MPEG stream corresponding to the selected period in storage section 11. Otherwise, retrieval section 30 may execute the retrieval processing while fetching the identification data from fourth demultiplexing section 26 not through second storage section 13, select a period matching the per-registered retrieval condition, and store the video streams and audio streams demultiplexed from the MPEG

stream corresponding to the selected period in storage section 11.

(Eighth embodiment)

FIG.11 is a block diagram of a video storage and retrieval apparatus according to the eighth embodiment of the present invention. In addition, the section with the same function as in FIG.2 or FIG.4 is given the same mark as in FIG.2 or FIG.4 to omit the specific explanation thereof in the following.

10 The video storage and retrieval apparatus of this embodiment has the configuration of the second embodiment, in which the retrieval data streams output from third demultiplexing section 25 are directly input to retrieval section 30.

15 The operation of the video storage and retrieval apparatus according to this embodiment is explained below. The multiplexed MPEG stream input to MPEG stream input section 1 is demultiplexed in third demultiplexing section 25 to the video streams, audio streams and 20 retrieval data streams. The demultiplexed retrieval data streams are input to directly retrieval section 30 not through storage section 11.

25 In this embodiment, the retrieval condition input from retrieval information input section 32 is registered in advance in retrieval section 30. Retrieval section 30 compares the identification information contained in the retrieval data stream input

from third demultiplexing section 25 to the pre-registered retrieval condition. Then, when the information and condition match, retrieval section 30 outputs a matching signal to control section 12.

When the matching signal is output from retrieval section 30, control section 12 controls storage section 11 to store the video streams and audio streams demultiplexed from the corresponding MPEG stream in storage section 11. As a result, the video and audio at the period matching the condition desired by a user are only stored in storage section 11.

As described above, the retrieval data streams are demultiplexed before the MPEG stream is stored in storage section 11, and input to retrieval section 30, and the period corresponding to the retrieval data stream matching the pre-registered retrieval condition is only stored in storage section 11, thereby enabling the efficient video recording.

In addition, in the above-mentioned embodiment, it
20 may be possible to provide fourth demultiplexing section
26 illustrated in FIG.5 before storage section 11 instead
of third demultiplexing section 25, and further provide
fifth demultiplexing section 27 illustrated in FIG.5
between storage section 11, and video decoding section
25 23 and audio decoding section 24. Then, retrieval
section 30 may execute the retrieval processing while
fetching the identification data from fourth

demultiplexing section 26, select a period matching the pre-registered retrieval condition, and store the streams of video data and audio data demultiplexed from the MPEG stream corresponding to the selected period in 5 storage section 11.

(Ninth embodiment)

FIG.12 is a block diagram of a video storage and retrieval system according to the ninth embodiment. In addition, the section with the same function as in FIG.2 10 or FIG.5 is given the same mark as in FIG.2 or FIG.5 to omit the specific explanation thereof in the following.

The video storage and retrieval system of this embodiment is comprised of video retrieval server 50, 15 video reproducing terminal 51 and transmission media 52.

Video retrieval server 50 is comprised of MPEG stream input section 1, fourth demultiplexing section 25, storage section 11, control section 12, comparison section 31, MPEG stream transmission section 4 which 20 transmits the MPEG stream comprised of multiplexed video data streams and audio data streams, and retrieval information reception section 6 which receives the retrieval information (scene contents).

Video reproducing terminal 51 is comprised of fifth 25 demultiplexing section 27, video decoding section 23, audio decoding section 24, retrieval information input section 32, video output section 2, audio output section

3, MPEG stream reception section 5 which receives the
MPEG stream comprised of multiplexed video data streams
and audio data streams, and retrieval information
transmission section 7 which transmits the retrieval
5 information.

Further, transmission media 52 between video
retrieval server 50 and video reproducing terminal 51
are comprised of communication networks, broadcasting
networks, or a combination of the communication networks
10 and broadcasting networks.

The operation of the video storage and retrieval
system in this embodiment is explained below. When a
user inputs the contents to be retrieved from retrieval
information input section 32 in video reproducing
15 terminal 51, the input retrieval information is
transmitted from retrieval information transmission
section 7 through transmission media 52 to video
retrieval server 50.

In video retrieval server 50, retrieval information
20 reception section 6 receives the retrieval information.
The received retrieval information is input to
comparison section 31. Comparison section 31 compares
the identification information in the retrieval data
streams stored in storage section 11 to the received
25 retrieval information to execute the video retrieval.
The video matching the retrieval information is
transmitted as multiplexed video and audio streams from

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MPEG stream transmission section 4 through transmission media 52 to video reproducing terminal 51.

In video reproducing terminal 51, MPEG stream reception section 5 receives the retrieved video and audio streams. The received video and audio streams are demultiplexed in fifth demultiplexing section 27, and the demultiplexed video streams and audio streams are respectively expanded in video decoding section 23 and audio decoding section 24, thus outputting the videos and audios.

Further, since the retrieval data streams are demultiplexed and stored in storage section 11, it is possible to concurrently execute the processing fast for the retrieval requests from a plurality of terminals.

15 In addition, when at least the storage section and retrieval section, and at least the video decoding section and audio decoding section in the video storage and retrieval apparatus described in one of the first to eighth embodiments and various modifications thereof
20 are respectively provided at the video retrieval server side, and at the video reproducing terminal, it may be possible to provide the other components at either side, enabling the appropriate design and/or modification.

As described above, according to the present invention, it is possible to concurrently execute the video reproducing processing and retrieval processing in parallel.

Further, according to the present invention, even in the case where the medium that can be accessed only sequentially such as a VTR is used as the storage section, it is possible to concurrently execute the video reproducing processing and retrieval processing.

The present invention is not limited to the above described embodiments, and various variations and modifications may be possible without departing from the scope of the present invention.

This application is based on the Japanese Patent Application No. HEI11-84337 filed on March 26, 1999, entire contents of which is expressly incorporated by reference herein.

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What is claimed is:

1. A video storage and retrieval apparatus comprising:
 - a storage that is configured to store a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data;
 - a plurality of demultiplexing sections that are configured to demultiplex said data stream stored in said storage to the video data, the audio data, and the identification data;
 - a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce; and
 - a retrieval section that is configured to retrieve specific video data and specific audio data based on demultiplexed identification data, wherein when occurrences of a reproduction request and a retrieval request overlap in time, said plurality of demultiplexing sections execute demultiplexing to extract the identification data for retrieval from said data stream and demultiplexing to extract the video data and the audio data each for reproduction from said data stream in parallel.
 2. The video storage and retrieval apparatus according to claim 1, further comprising:
 - a plurality of demultiplexing sections that are configured to execute demultiplexing to extract the

identification data for retrieval from said data stream;
and

a plurality of retrieval sections that are configured to retrieve specific video data and specific
5 audio data based on the identification data,

wherein said plurality of demultiplexing sections and said plurality of retrieval sections execute retrieval processing on a plurality of data streams in parallel.

3. The video storage and retrieval apparatus according
10 to claim 1, wherein said data stream is input to the demultiplexing section that executes demultiplexing to extract the identification data for retrieval at a data transfer rate higher than a data transfer rate at which said data stream is input to the demultiplexing section
15 that executes demultiplexing to extract the video data and the audio data each for reproduction.

4. A video storage and retrieval apparatus comprising:
a demultiplexing section that is configured to demultiplex a data stream in which identification data
20 with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the video data, the audio data and the identification data;

a storage that is configured to store the video data,
25 the audio data, and the identification data, each demultiplexed in said demultiplexing section;

a decoding section that is configured to decode the

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video data and the audio data, each stored in said storage,
to reproduce; and

a retrieval section that is configured to retrieve
specific video data and specific audio data based on the
5 identification data stored in said storage.

5. A video storage and retrieval apparatus comprising:
a first demultiplexing section that is configured
to demultiplex a data stream in which identification data
with identification information for retrieval
10 incorporated therein is multiplexed along with video
data and audio data to streams of multiplexed video data
and audio data, and the identification data;

a storage that is configured to store the streams
of multiplexed video data and audio data, and the
15 identification data, each demultiplexed in said first
demultiplexing section;

a second demultiplexing section that is configured
to demultiplex the streams of multiplexed video data and
audio data stored in said storage to the video data and
20 the audio data;

a decoding section that is configured to decode the
video data and the audio data, each demultiplexed in said
second demultiplexing section, to reproduce; and

a retrieval section that is configured to retrieve
25 specific video data and specific audio data based on the
identification data stored in said storage.

6. A video storage and retrieval apparatus comprising:

a storage that is configured to store a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data;

5 a plurality of demultiplexing sections that are configured to demultiplex said data stream stored in said storage to the video data, the audio data, and the identification data;

10 a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce;

15 a retrieval section that is configured to retrieve specific video data and specific audio data based on demultiplexed identification data; and

20 a temporary storage, provided between said storage and said decoding section, which is capable of being accessed randomly,

wherein said temporary storage temporarily stores said data stream.

25 7. A video storage and retrieval apparatus comprising:
 a storage that is configured to store a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data;

30 a demultiplexing section that is configured to demultiplex said data stream stored in said storage to the video data, the audio data, and the identification

data;

a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce;

5 a retrieval section that is configured to retrieve specific video data and specific audio data based on demultiplexed identification data; and

10 a temporary storage, provided between said demultiplexing section and said decoding section, which is capable of being accessed randomly,

wherein said temporary storage temporarily stores the video data and the audio data each demultiplexed.

8. A video storage and retrieval apparatus comprising:

15 a storage that is configured to store a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data;

20 a demultiplexing sections that is configured to demultiplex said data stream stored in said storage to the video data, the audio data, and the identification data;

25 a temporary storage, capable of being accessed randomly, that is configured to temporarily store the video data and the audio data and the identification data each demultiplexed;

 a decoding section that is configured to decode the video data and the audio data, each read from said

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temporary storage, to reproduce; and

a retrieval section that is configured to retrieve specific video data and specific audio data based on the identification data read from said temporary storage.

5 9. A video storage and retrieval apparatus comprising:
a storage that is configured to store a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data;

10 a demultiplexing section that is configured to demultiplex said data stream stored in said storage to the identification data and streams of multiplexed video data and audio data;

15 a decoding section that is configured to decode the streams of multiplexed video data and audio data to reproduce;

a retrieval section that is configured to retrieve specific video data and specific audio data based on demultiplexed identification data; and

20 a temporary storage, provided between said demultiplexing section and said decoding section, which is capable of being accessed randomly,
wherein said temporary storage temporarily stores the streams of multiplexed video data and audio data.

25 10. A video storage and retrieval apparatus comprising:
a storage that is configured to store a data stream in which identification data with identification

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information for retrieval incorporated therein is multiplexed along with video data and audio data;

a demultiplexing section that is configured to demultiplex said data stream stored in said storage to
5 the identification data and streams of multiplexed video data and audio data;

a decoding section that is configured to decode the streams of multiplexed video data and audio data to reproduce;

10 a retrieval section that is configured to retrieve specific video data and specific audio data based on demultiplexed identification data; and

a temporary storage, provided between said demultiplexing section and said decoding section, which
15 is capable of being accessed randomly,

wherein said temporary storage temporarily stores the demultiplexed identification data and the streams of multiplexed video data and audio data.

11. The video storage and retrieval apparatus according
20 to claim 6, wherein said data stream stored in said temporary storage is output to said demultiplexing section that executes demultiplexing to extract the video data and the audio data each for reproduction from said data stream, and said data stream is output to said
25 demultiplexing section that executes demultiplexing to extract the identification data for retrieval from said data stream without being passed through said temporary

storage.

12. A video storage and retrieval apparatus comprising:

a demultiplexing section that is configured to demultiplex a data stream in which identification data incorporated therein is multiplexed along with video data and audio data to the video data, the audio data and the identification data;

5 with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the video data, the audio data and the identification data;

a storage that is configured to store the video data and the audio data each demultiplexed;

10 a second storage that is configured to store demultiplexed identification data;

a decoding section that is configured to decode the video data and the audio data each read from said storage 15 to reproduce; and

a retrieval section that is configured to retrieve specific video data and specific audio data based on the identification data read from said second storage.

13. A video storage and retrieval apparatus comprising:

20 a first demultiplexing section that is configured to demultiplex a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the identification data and streams of multiplexed video data and audio data;

25 a storage that is configured to store the streams of multiplexed video data and audio data

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- a second storage that is configured to store demultiplexed identification data;
- a second demultiplexing section that is configured to demultiplex the streams of multiplexed video data and
- 5 audio data read from said storage to the video data and the audio data;
- a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce; and
- 10 a retrieval section that is configured to retrieve specific video data and specific audio data based on the identification data read from said second storage.
14. The video storage and retrieval apparatus according to claim 12, wherein said second storage is comprised
- 15 of a recording device which is capable of being accessed randomly.
15. A video storage and retrieval apparatus comprising:
- a demultiplexing section that is configured to demultiplex a data stream in which identification data
- 20 with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the video data, the audio data and the identification data;
- a retrieval section that is configured to select
- 25 a period matching a pre-registered retrieval condition from said data stream based on demultiplexed identification data;

a storage that is configured to store data corresponding to the selected period of the video data and the audio data each demultiplexed; and

5 a decoding section that is configured to decode the video data and the audio data, each stored in said storage, to reproduce.

16. A video storage and retrieval apparatus comprising:

a first demultiplexing section that is configured to demultiplex a data stream in which identification data 10 with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the identification data and streams of multiplexed video data and audio data;

a retrieval section that is configured to select 15 a period matching a pre-registered retrieval condition from said data stream based on demultiplexed identification data;

a storage that is configured to store data corresponding to the selected period of the streams of 20 multiplexed video data and audio data;

a second demultiplexing section that is configured to demultiplex the streams of multiplexed video data and audio data stored in said storage to the video data and the audio data; and

25 a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce.

17. A video storage and retrieval apparatus comprising:
a demultiplexing section that is configured to
demultiplex a data stream in which identification data
with identification information for retrieval
incorporated therein is multiplexed along with video
data and audio data to the video data, the audio data
and the identification data;

5 a second storage that is configured to store
demultiplexed identification data;

10 a retrieval section that is configured to select
a period matching a pre-registered retrieval condition
from said data stream based on the identification data
stored in said second storage;

15 a storage that is configured to store data
corresponding to the selected period of the video data
and the audio data each demultiplexed; and

20 a decoding section that is configured to decode the
video data and the audio data, each stored in said storage,
to reproduce.

25 18. A video storage and retrieval apparatus comprising:
a first demultiplexing section that is configured
to demultiplex a data stream in which identification data
with identification information for retrieval
incorporated therein is multiplexed along with video
data and audio data to the identification data and streams
of multiplexed video data and audio data;

20 a second storage that is configured to store

demultiplexed identification data;

a retrieval section that is configured to select a period matching a pre-registered retrieval condition from said data stream based on the identification data stored in said second storage;

a storage that is configured to store streams corresponding to the selected period of the streams of multiplexed video data and audio data;

10 a second demultiplexing section that is configured to demultiplex the streams of multiplexed video data and audio data stored in said storage to the video data and the audio data; and

15 a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce.

19. The video storage and retrieval apparatus according to claim 1, wherein said data stream is an MPEG stream conforming to MPEG as a moving picture coding standard.

20. The video storage and retrieval apparatus according to claim 19, wherein in said MPEG stream, each of the video data, the audio data and the identification data is constructed in packets, and said packets are multiplexed as Packetized Elementary Stream.

21. The video storage and retrieval apparatus according to claim 19, wherein in said MPEG stream, the identification data is contained in a stream header to include stream information, and is multiplexed along

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with the video data and the audio data.

22. The video storage and retrieval apparatus according to claim 19, wherein in said MPEG stream, the identification data is stored as a private descriptor 5 in a PAT (Program Association Table), a PMT (Program Map Table) or a CAT (Conditional Access Table), and is multiplexed along with the video data and the audio data.

23. The video storage and retrieval apparatus according to claim 19, wherein in said MPEG stream, the 10 identification data is stored as private data section, and is multiplexed along with the video data and the audio data.

24. A video retrieval server apparatus comprising:
a first demultiplexing section that is configured 15 to demultiplex a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to streams of multiplexed video data and audio data and the identification data;

20 a retrieval section that is configured to select a period matching a retrieval condition received from a video reproducing terminal via a transmission medium from said data stream based on demultiplexed identification data;

25 a storage that is configured to store data corresponding to the selected period of the streams of multiplexed video data and audio data;

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a transmission section that is configured to transmit said streams of multiplexed video data and audio data stored in said storage to said video reproducing terminal via said transmission medium.

- 5 25. A video reproducing terminal that provides a retrieval request to the video retrieval server apparatus according to claim 24, comprising:

a transmission section that is configured to transmit a retrieval condition to the video retrieval

- 10 server apparatus via a transmission medium;
a reception section that is configured to receive
streams of multiplexed video data and audio data as a
retrieved result from said video retrieval server
apparatus;

- 15 a second demultiplexing section that is configured
to demultiplex received streams of multiplexed video
data and audio data to the video data and the audio data;
and

- a decoding section that is configured to decode the
20 video data and the audio data, each demultiplexed, to
reproduce.

26. A video retrieval system comprising:

a video retrieval server apparatus according to claim 24;

- 25 a video reproducing terminal that provides a
retrieval request to the video retrieval server
apparatus; and

a transmission medium that connects said video retrieval server apparatus and said video reproducing terminal, said transmission medium being a communication network, a broadcasting network or thereof,
5 wherein said video reproducing terminal has a transmission section that is configured to transmit a retrieval condition to the video retrieval server apparatus via a transmission medium, a reception section that is configured to receive streams of
10 multiplexed video data and audio data as a retrieved result from said video retrieval server apparatus,

a second demultiplexing section that is configured to demultiplex received streams of multiplexed video data and audio data to the video data and the audio data,
15 and a decoding section that is configured to decode the video data and the audio data, each demultiplexed, to reproduce.

27. A video storage and retrieval method comprising:
storing a data stream in which identification data
20 with identification information for retrieval incorporated therein is multiplexed along with video data and audio data in a recording medium;

reading the data stream as an object to be reproduced and the data stream as an object to be
25 retrieved from said recording medium when occurrences of a reproduction request and a retrieval request overlap in time;

demultiplexing in parallel both data streams to the video data, the audio data and the identification data; and

decoding the video data and the audio data, each 5 demultiplexed from the data stream as the object to be reproduced, to reproduce, while retrieving specific video data and specific audio data based on the identification data demultiplexed from the data stream as the object to be retrieved.

10 28. A video storage and retrieval method comprising:
demultiplexing a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the video data, the audio
15 data, and the identification data;

reading the identification data contained in the data stream as an object to be retrieved in parallel with the video data and the audio data each as an object to be reproduced from said recording medium when 20 occurrences of a reproduction request and a retrieval request overlap in time; and

decoding the video data and the audio data, each read from said recording medium, to reproduce, while retrieving specific video data and specific audio data
25 based on the identification data.

29. A video storage and retrieval method comprising:
demultiplexing a data stream in which

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identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to streams of multiplexed video data and audio data, and the identification data;

5 storing the streams of multiplexed video data and audio data, and the identification data in a recording medium;

reading the identification data contained in the data stream to be retrieved in parallel with the streams 10 of multiplexed video data and the audio data as objects to be reproduced from said recording medium when occurrences of a reproduction request and a retrieval request overlap in time; and

decoding the video data and the audio data, each 15 demultiplexed from the streams, to reproduce, while retrieving specific video data and specific audio data based on the identification data.

30. A video storage and retrieval method, comprising:
 storing a data stream in which identification data 20 with identification information for retrieval incorporated therein is multiplexed along with video data and audio data in a recording medium which is capable of been accessed only sequentially;

 transferring the data stream as an object to be 25 reproduced and/or the data stream as an object to be retrieved to a temporary storage from said recording medium;

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reading the data stream as the object to be reproduced and the data stream as the object to be retrieved from said temporary storage when occurrences of a reproduction request and a retrieval request overlap
5 in time; and

demultiplexing in parallel both data streams to the video data, the audio data and the identification data;

decoding the video data and the audio data, each demultiplexed from the stream as the object to be reproduced, to reproduce, while retrieving specific video data and specific audio data based on the identification data demultiplexed from the data stream as the object to be retrieved.
10

31. A video storage and retrieval method, comprising:

15 demultiplexing a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data to the video data, the audio data and the identification data;

20 selecting a period matching a pre-registered retrieval condition from said data stream based on demultiplexed identification data;

storing data corresponding to the selected period of the video data and the audio data each demultiplexed;

25 and

decoding the video data and the audio data, each stored, to reproduce.

ABSTRACT OF THE DISCLOSURE

An apparatus of the present invention has a storage that stores a data stream in which identification data with identification information for retrieval incorporated therein is multiplexed along with video data and audio data, a plurality of demultiplexing sections that demultiplex the stored data stream to the video data, audio data and identification data, a video data and audio data decoding section that decodes the 10 video data and audio data, each demultiplexed, to reproduce, and a retrieval section that retrieves specific video data and specific audio data based on the demultiplexed identification data, and thus executes the video reproduction and retrieval in parallel.

15

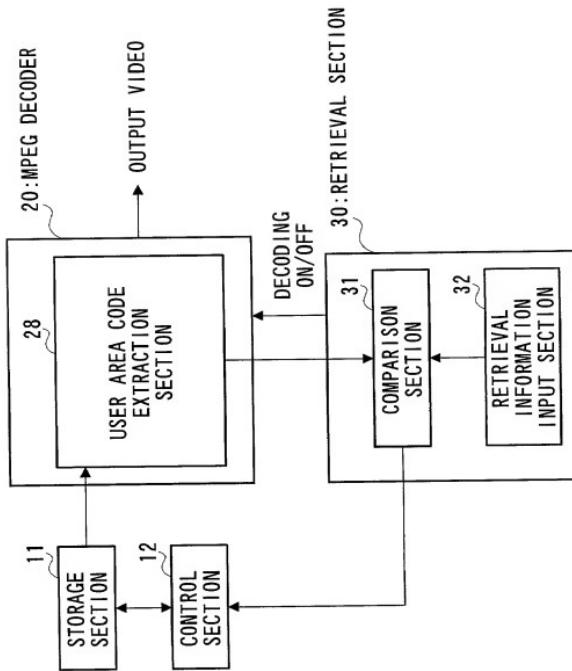
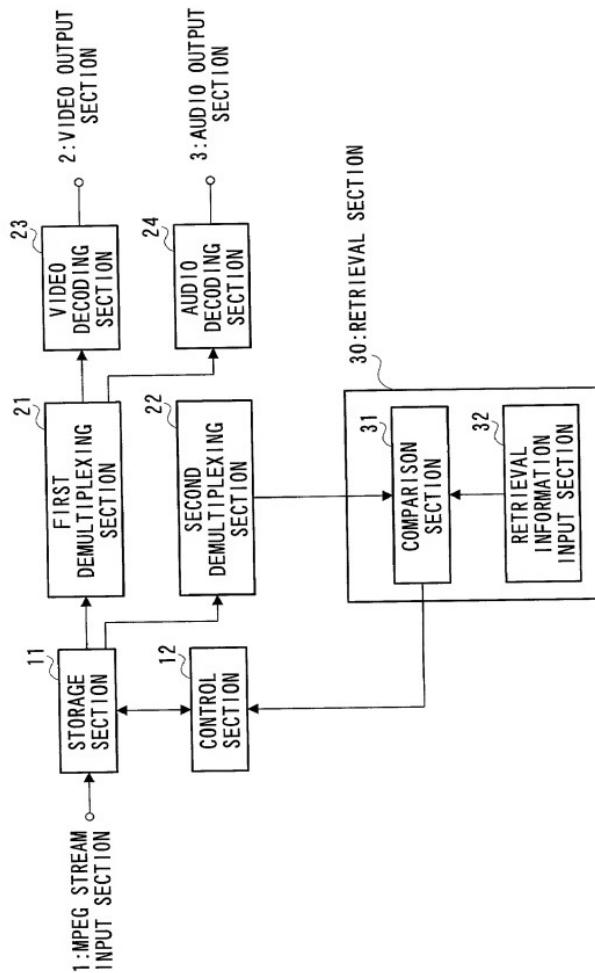


FIG. 1

FIG. 2



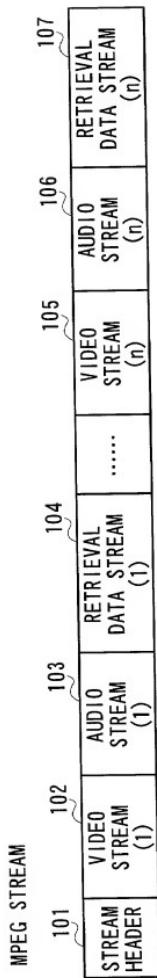


FIG. 3A

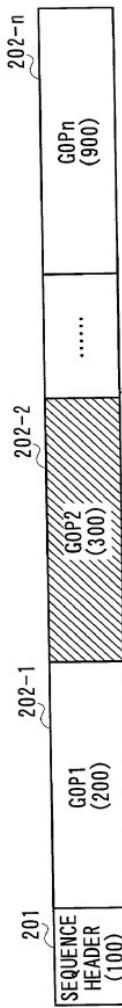


FIG. 3B

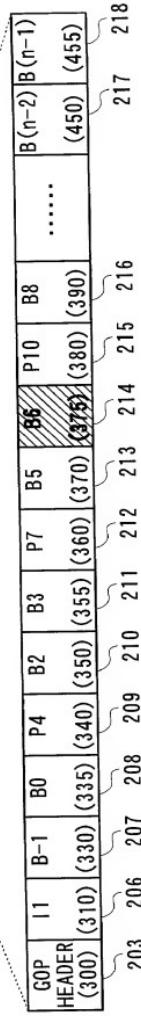


FIG. 3C

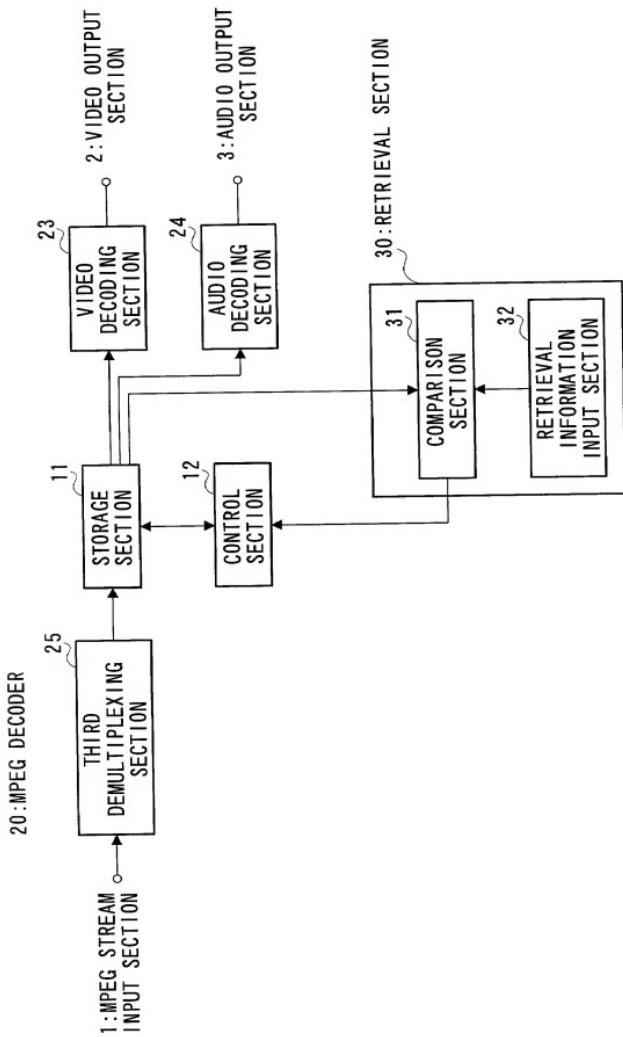


FIG. 4

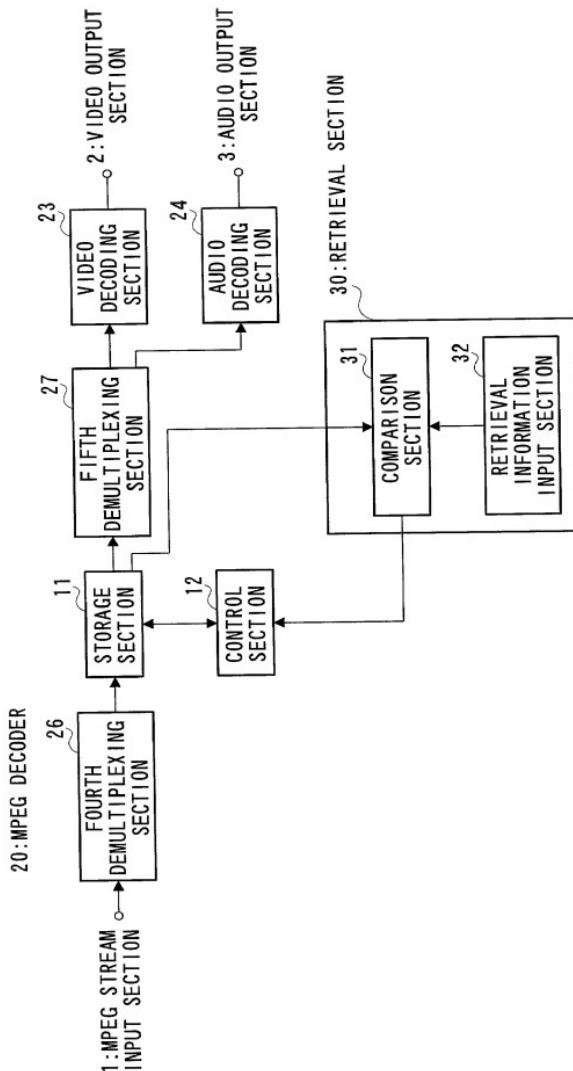


FIG. 5

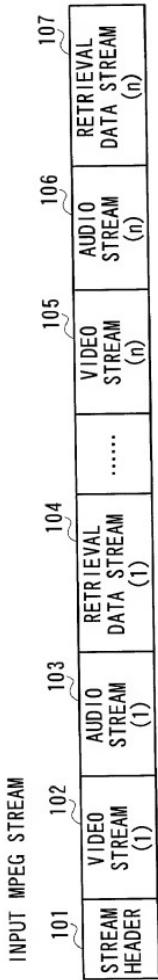


FIG. 6A

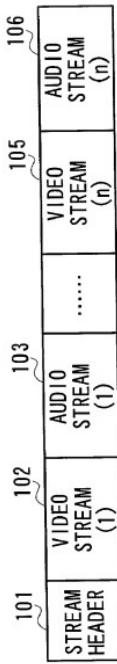


FIG. 6B



FIG. 6C

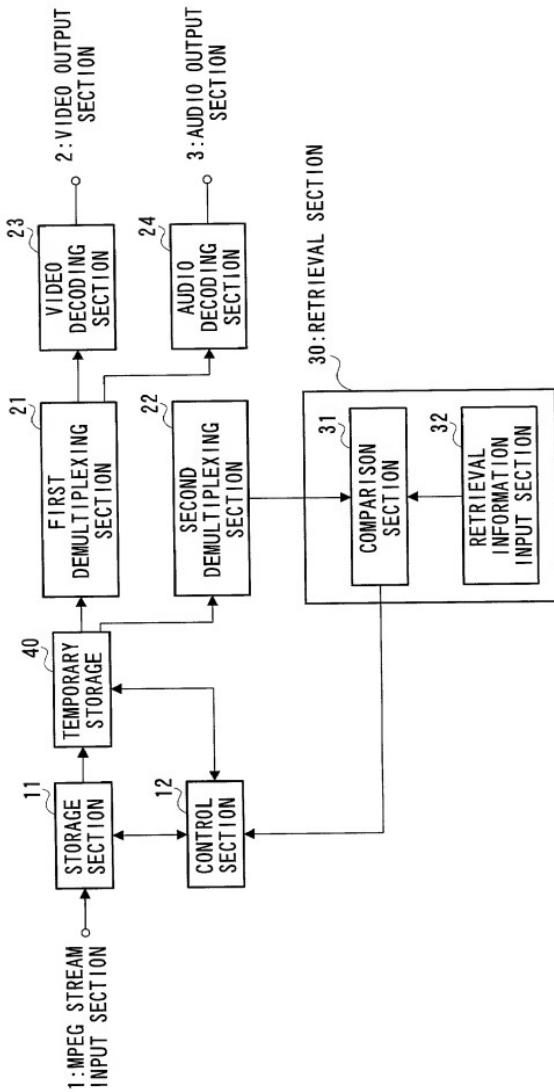


FIG. 7

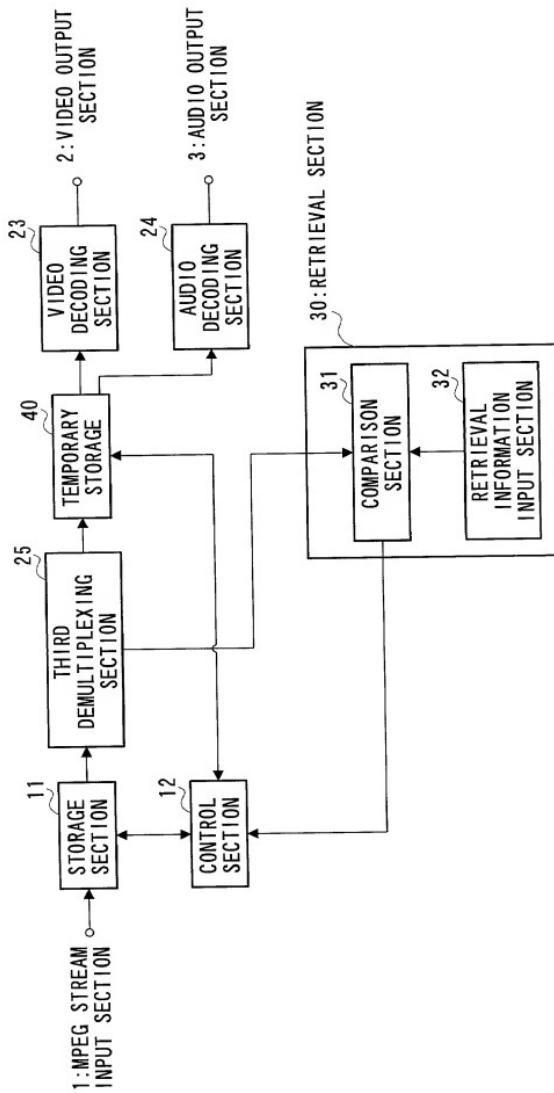


FIG. 8

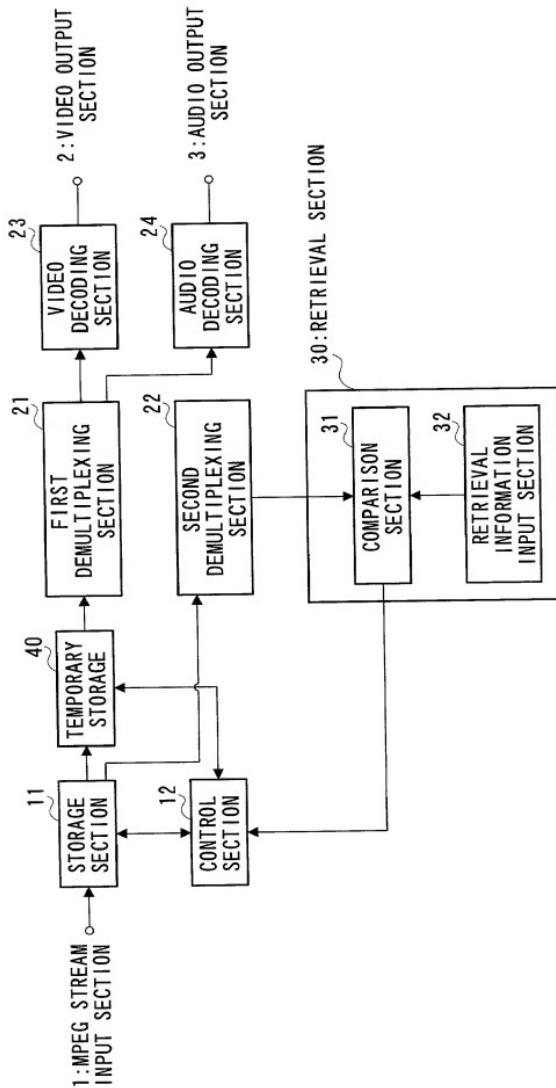


FIG. 9

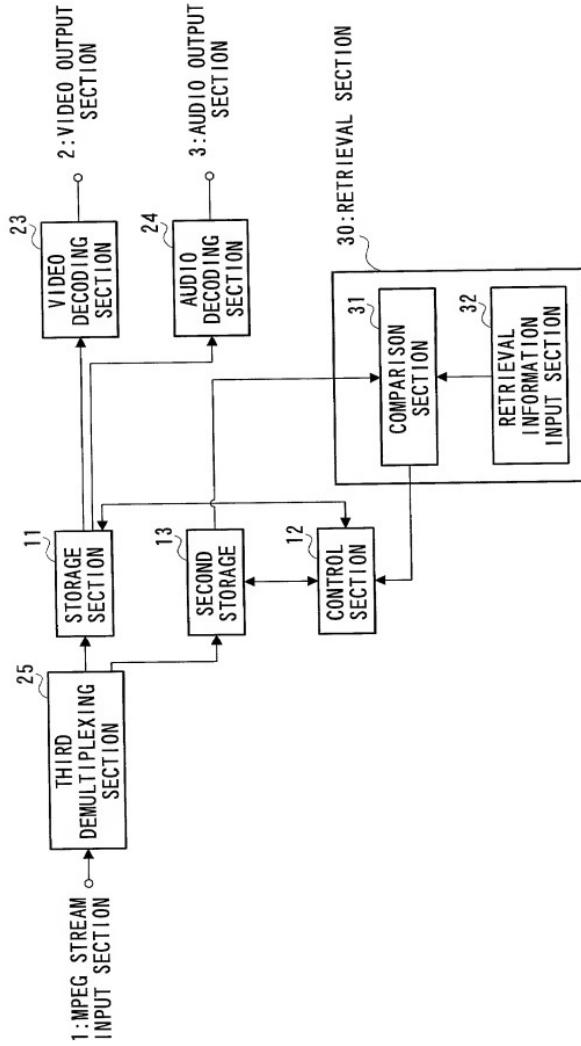


FIG. 10

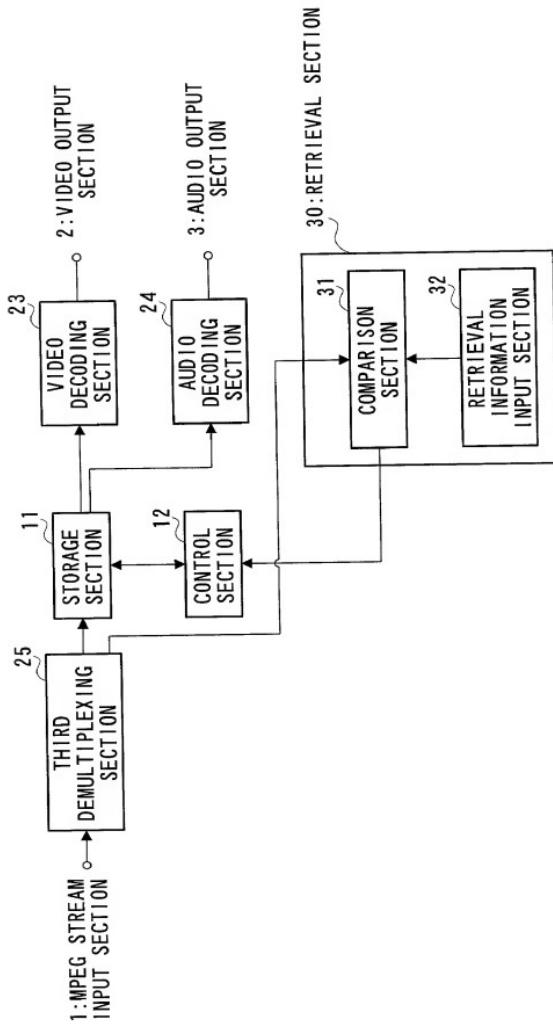


FIG. 11

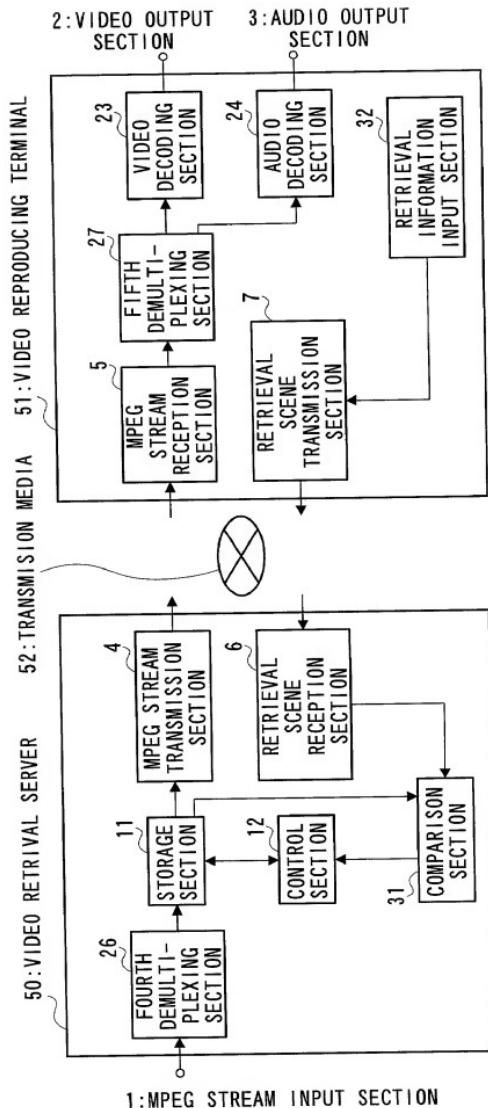


FIG. 12

Declaration and Power of Attorney For Utility or Design Patent Application

特許出願宣言書

Japanese Language Declaration

私は、下欄に氏名を記載した発明者として、以下のとおり
宣言する:
私の住所、郵便の宛先および国籍は、下欄に氏名に統一して記載したとおり
であり。
名前の発明に関して、請求の範囲に記載した特許を求める主題の本来の、
最初にして唯一の発明者である(一人の氏名のみが下欄に記載されている
場合)か、もしくは本来の、最初にして共同の発明者である(複数の氏名が
下欄に記載されている場合)と信じ。

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated
below next to my name.

I believe I am the original, first and sole inventor (if only one name
is listed below) or an original, first and joint inventor (if plural
names are listed below) of the subject matter which is claimed
and for which a patent is sought on the invention entitled

VIDEO STORAGE AND RETRIEVAL APPARATUS

上記発明の明細書(下記の欄でX印がついていない場合は、
本書に添付)は、

年 月 日に提出され、
とし。
米国出願番号
(該当する場合) 年 月 日に訂正されました。又は、

特許協定条約国出願番号 とし、
(該当する場合) 年 月 日に訂正されました。

私は、前期のとおり補正した請求の範囲を含む前記明細書の内容を検討し、理解したことを陳述する。

私は、連邦規則法典第37編第1条第56項定義されるとおり、特許資格の有無について重要な情報を開示すべき義務をあることを認めます。

私は合衆国法典第35部第119条(a-d)項又は第365条(b)項に基づく、下記の外国特許出願又は発明者出願、或いは第365条(a)項に基づく、少なくとも米国以外の国を指名したPCT国際出願の外国優先権を主張し、更に優先権の主張に係る基礎出願の出願日前の出願日を有する外国特許出願、又は発明者出願又いはPCT国際出願を以下に「なし」の箇に印をつけることにより明記する:

the specification of which is attached hereto unless the following
box is checked:

was filed on _____ as
United States Application Number _____
and was amended on _____ (if applicable) or,

PCT International Application Number _____
and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of
the above identified specification, including the claims, as
amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to
patentability as defined in Title 37, Code of Federal Regulations,
§1.56.

I hereby claim foreign priority under Title 35, United States Code
§119(a-d) or §365(b) of any foreign application(s) for patent or
inventor's certificate, or §365(a) of any PCT international
application which designated at least one country other than the
United States, listed below. I have also identified below, by
checking the "No" box, any foreign application for patent or
inventor's certificate, or of any PCT international application having
a filing date before that of the application on which priority is
claimed:

Prior foreign applications 先の外国出願

JP11-084337
(Number)
(番号)

JAPAN
(Country)
(国名)

26/March/1999
(Day/Month/Year Filed)
(出願の年月日)

Priority claimed
優先権の主張

Yes あり
 No なし

(Number)
(番号)

(Country)
(国名)

(Day/Month/Year Filed)
(出願の年月日)

Yes あり
 No なし

(Number)
(番号)

(Country)
(国名)

(Day/Month/Year Filed)
(出願の年月日)

Yes あり
 No なし

□ その他の外国特許出願番号は別紙の追補優先権欄にて記載す。

□ Additional foreign application numbers are listed on a
supplemental priority sheet attached hereto.

Japanese Language Utility or Design Patent Application Declaration

私は、合衆国法典第35部第119条(e)項に基づく、下記の合衆国仮特許出願の利益を主張する。

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

(Application Number)
(番号)

(Day/Month/Year Filed)
出願の年月日

(Application Number)
(番号)

(Day/Month/Year Filed)
出願の年月日

(Application Number)
(番号)

(Day/Month/Year Filed)
出願の年月日

その他の合衆国仮特許出願番号は別紙の追補優先権欄にて記載する。

私は、合衆国法典第35部第120条に基づく下記の合衆国特許出願、又は第365条(c)項に基づく合衆国を指したPCT国際出願の利益を主張し、本願の請求の範囲各項に記載の主題が合衆国法典第35部第120条第1項規定の様態で、先の合衆国特許出願又はPCT国際出願に開示されていない限度において、先の出願の出願日と本願の国内出願日又はPCT国際出願日の間に有効となった連邦規則法典第37前第1章第56条に記載の特許要件に所要の情報を開示すべき義務を有することを認める。

Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

(Application No.)
(出願番号)

(Day/Month/Year Filed)
(出願の年月日)

(現況)
(特許済み、係属中、放棄済み)

(Status)
(patented, pending, abandoned)

(Application No.)
(出願番号)

(Day/Month/Year Filed)
(出願の年月日)

(現況)
(特許済み、係属中、放棄済み)

(Status)
(patented, pending, abandoned)

その他の合衆国又は国際特許出願番号は別紙の追補優先権欄にて記載する。

私は、ここに自己の知識にもとづいて行った陳述がすべて真実であり、自己の有する情報および信ずるところに従つて行った陳述が真実であると信じ、さらに故意に虚偽の陳述を行つた場合、合衆国法典第18部第1001条により、罰金もしくは禁錮に処せられるか、またはこれらの方が併科され、またかかる故意による虚偽による陳述が本願ないし本願に對して付与される特許の有効性を損なうことがあることを認識して、以下の陳述を行つたことを宣言する。

私は、下記署名者は、ここに記載の米国弁護士または代理人に本出願に關し特許商標庁にて取扱いとなるかかる行為に關して、同米国弁護士又は代理人が、私に直接連絡なしに私の外国弁護士あるいは法人代表者からの指示を受け取り、それに従つようここに委任する。この指示を出す者が変更の場合には、ここに記載の米国弁護士又は代理人にその旨通知される。

Additional U. S. or international application numbers are listed on a supplemental priority sheet attached hereto.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code; and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

The undersigned hereby authorizes the U.S. attorney or agent named herein to accept and follow instructions from either his foreign patent agent or corporate representative, if any, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorney or agent and the undersigned. In the event of a change in the persons from whom instructions may be taken, the U.S. attorney or agent named herein will be so notified by the undersigned.

Japanese Language Utility or Design Patent Application Declaration

委任状：私は、下記発明者として、下記に明記された顧客番号を伴う以下の弁護士又は、代理人をここに選任し、本願の手続きを遂行すること並びにこれに関する一切の行為を持特許商標庁に對して行うことを委任する。そして全ての通信はこの顧客番号宛に差送される。

顧客番号 7055

現在選任された弁護士は下記の通りである。

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同第2共同発明者の署名	日付	Second Inventor's signature	Date
住所	Residence		
国籍	Citizenship		
郵便の宛先	Post Office Address		

(第三またはそれ以降の共同発明者に対しても同様な情報
および署名を提供すること。)

(Supply similar information and signature for third and subsequent joint inventors.)